

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A lithographic projection apparatus comprising:
 - an illuminator configured to provide a projection beam of radiation;
 - a support structure configured to hold a patterning device, the patterning device configured to pattern the projection beam according to a desired pattern;
 - a substrate table configured to hold a substrate;
 - a projection system configured to project the patterned beam onto a target portion of the substrate; and
 - a measurement system comprising:
 - a diffractive element and a diffuser structure configured to increase the pupil filling of the radiation in the pupil of the projection system relative to pupil filling of the radiation in the pupil of the projection system attributable to the diffractive element alone, both movable into the projection beam between a radiation system and the projection system, and
 - a sensor module configured to sense radiation that has traversed the projection system to measure wave front aberrations of the projection system.
2. (Original) A lithographic projection apparatus according to claim 1, wherein said sensor module is configured to measure wave front aberrations of the projection system.
3. (Cancelled)
4. (Currently Amended) A lithographic projection apparatus according to claim 13, wherein a single member has the function of both the diffractive element and the diffuser structure ~~configured to diffuse the radiation~~.
5. (Currently Amended) A lithographic projection apparatus according to claim 13, wherein the diffractive element comprises a reflective grating in which the reflective portions comprise the diffuser structure ~~configured to diffuse the radiation~~.

6. (Currently Amended) A lithographic projection apparatus according to claim 13, wherein the diffuser ~~structure configured to diffuse the radiation~~ comprises an array of reflective portions randomly staggered in height.

7. (Original) A lithographic projection apparatus according to claim 6, wherein each reflective portion comprises a multilayer structure.

8. (Currently Amended) A lithographic projection apparatus according to claim 13, wherein the diffuser ~~structure configured to diffuse the radiation~~ comprises sub-resolution absorptive features.

9. (Currently Amended) A lithographic projection apparatus according to claim 13, wherein the diffractive element comprises a transmissive grating, and the measurement system further comprises a mirror configured to direct the projection beam to illuminate the grating from behind, wherein the diffuser ~~structure configured to diffuse the radiation~~ comprises imperfections in the mirror.

10. (Original) A lithographic projection apparatus according to claim 9, wherein said mirror is curved to provide a focusing effect.

11. (Currently Amended) A lithographic projection apparatus according to claim 1, wherein the diffractive element comprises a transmissive grating, and the measurement system further comprises a mirror configured to direct the projection beam to illuminate the grating from behind, wherein the mirror is curved to provide a focusing effect and comprises the diffuser structure configured to increase the pupil filling of the radiation in the pupil of the projection system.

12. (Original) A lithographic projection apparatus according to claim 9, wherein, in use, the mirror is tilted at an angle relative to the plane of the grating to provide a tilted illumination beam.

13. (Original) A lithographic projection apparatus according to claim 11, wherein, in use, the mirror is tilted at an angle relative to the plane of the grating to provide a tilted illumination beam.

14. (Original) A lithographic projection apparatus according to claim 1, further comprising at least one Fresnel amplitude zone plate movable into the projection beam configured to focus the beam that reaches the diffractive element.

15. (Currently Amended) A lithographic projection apparatus according to claim 1, wherein the diffuser structure configured to increase the pupil filling is configured such that the radiation of the measurement system at least substantially fills the pupil of the projection system.

16. (Original) A lithographic projection apparatus according to claim 1, wherein the sensor module comprises a further diffractive element, such as a grating, and a radiation sensor, such as a CCD.

17. (Original) A lithographic projection apparatus according to claim 1, wherein said projection beam of radiation comprises EUV radiation.

18. (Currently Amended) A measurement system to measure wave front aberrations of a projection system, said measurement system comprising:

a diffractive element and a diffuser structure configured to increase pupil filling of radiation in a pupil of the projection system relative to pupil filling of the radiation in the pupil of the projection system attributable to the diffractive element alone, both movable into a projection beam between a radiation system and the projection system; and

a sensor module configured to sense radiation that has traversed the projection system to measure wave front aberrations of the projection system.

19. (Cancelled)

20. (Currently Amended) A measurement system according to claim ~~18~~19, wherein the diffractive element comprises a reflective grating in which the reflective portions comprise the diffuser ~~structure configured to diffuse the radiation~~.

21. (Currently Amended) A measurement system according to claim ~~18~~19, wherein the diffuser ~~structure configured to diffuse the radiation~~ comprises an array of reflective portions randomly staggered in height.

22. (Currently Amended) A measurement system according to claim ~~18~~19, wherein the diffuser ~~structure configured to diffuse the radiation~~ comprises sub-resolution absorptive features.

23. (Currently Amended) A measurement system according to claim ~~18~~19, wherein the diffractive element comprises a transmissive grating, and the measurement system further comprises a mirror configured to direct the projection beam to illuminate the grating from behind, wherein the diffuser ~~structure configured to diffuse the radiation~~ comprises imperfections in the mirror.

24. (Currently Amended) A measurement system according to claim 18, wherein the diffractive element comprises a transmissive grating, and the measurement system further comprises a mirror configured to direct the projection beam to illuminate the grating from behind, wherein the mirror is curved to provide a focusing effect and comprises the diffuser structure configured to increase the pupil filling of the radiation in the pupil of the projection system.

25. (Original) A measurement system according to claim 23, wherein, in use, the mirror is tilted at an angle relative to the plane of the grating to provide a tilted illumination beam.

26. (Original) A measurement system according to claim 24, wherein, in use, the mirror is tilted at an angle relative to the plane of the grating to provide a tilted illumination beam.

27. (Original) A lithographic projection apparatus comprising:

- an illuminator configured to provide a projection beam of radiation;
- a support structure configured to hold a patterning device, the patterning device configured to pattern the projection beam according to a desired pattern;
- a substrate table configured to hold a substrate;
- a projection system configured to project the patterned beam onto a target portion of the substrate; and
- a measurement system configured to measure defocus of the apparatus, comprising a transmissive grating and a mirror configured to direct the projection beam to illuminate the grating from behind, wherein, in use, the mirror is tilted at an angle relative to the plane of the grating to provide a tilted illumination beam.

28. (Original) A lithographic projection apparatus according to claim 27, wherein the mirror is at least one of plane and curved.

29. (Original) A lithographic projection apparatus according to claim 27, wherein the mirror is adjustably tiltable by means of an actuator.

30. (New) A lithographic projection apparatus according to claim 27, wherein said projection beam comprises EUV radiation.

31. (New) A measurement system according to claim 18, further comprising at least one Fresnel amplitude zone plate movable into the projection beam configured to focus the beam that reaches the diffractive element.